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Philosophical Transactions

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* This expression was added, to leave Liberty for a further inquiry, whether the Experiment, which hereby appears convincing as to the main thing intended to be proved, may not admit the having something further debated, and annex'd about some circumstantial thing or other.

it weighs very near * or altogether as much in Water, as the self same portion of liquor would weigh in the Air.

The same day were repeated the Experiment with another sealed Bubble, larger then the former (being as bigg as a great Hen-egg,) and having broken this under water, it grew heavier by 7. drachms and 34. graines; and having taken out the Bubble, and driven out the water into a

counterpois'd Glass, we found the transvasated liquor to amount to the same weight, abating 6 or 7 graines, which it might well have lost upon such accompts, as have been newly mentioned.

An Extract of a Letter

Written by Mr. Joshua Childrey to the Publisher, containing an Accomp't of a passage by sea to the East-Indies, communicated to him by that Ingenious Travailor Mr. Richard Smithson Who made two voyages into those parts.

From England to Cape Finis Terra in Gallicia in 44. degr. North Lat. the Winds are as variable as with Vs; onely the Bay of Biscay is more subject to storms, and the Sea more rough, and the Waves running very high.

From thence to 34. degr. The Wind is variable also, but if you be within 100 leagues of the European Continent, it is generally inclined to *North-East*

From 34 degrees, if you be inclining to the coast of *Africa*, or about the Meridian of the *Canaries*, the Wind is so certain, and constn'tly at *North-East* (or within two points) that it is rare to find it otherwise. Yet in Winter, upon the coast of *Africa* there are sometimes Westerly storms, that are violent, but of no long continuance. And in Summer, when it is sometimes calme, the Air will come variably. These *North-East-Winds* hold most commonly to 8.degrees *North-Latitude*, and then begin the *Tornado Winds*, which are most part confined between 8. and 4. degrees *North-Latitude*. They are sel-

dome or never more Southerly; but on this side the Line they have sometimes been met between 11. and 12. degrees *North-Latitude*, and sometimes in 9. and 10. degrees. These *Tornadoes* are vncertain winds, blowing from all points of the *Compass* in the same hour, and sometimes the wind shifts thus without being intermitting, and other whiles it will be stark calme, almost between every puff. They are so confus'd, that let 4. or 5. Ships sail together as near as is fitting for Ships that keep company, at the same instant many times every Ship shall have a severall and contrary wind. And this place is almost alwayes infested with horrible thunders, lightnings and rain. And the nearer you are to the *Africk-shore*, so much more dreadfull is the Thunder and Rain: but the further *West-ward* you goe, the Thunder and Rain will be less, and the Winds not so vncertain; so that, if you go as farr West, as the Meridian of the East-side of *Brasile*, there is little Thunder, neither doth the Wind come down in such puffs and flawes; but between 4. and 8. degrees it is most inclined to *Calmes*, and very great and thick *Foggs*, and the Raines come not in such violent showers.

Likewise this is a sure rule, that near the *Africk-shore*, and so for 100. or 200. leagues *West*, the *North-East-Winds* commonly inclin more and more to the *East*; so that by that time, you come to the *West* of the Meridian of the *Azores* about 20. degrees, the *Trade* or constant Wind will be mostly *East-North-East*.

Now as from 34. degr. to 44. near the *Continent of Europe*, the Winds are commonly between *East* and *North*; so after you come so farr West as the Meridian of the hithermost of the *Azores*, they are commonly between *South-West* and *North-West*. And for this reason Ships, that are outward bound to the *Streights*, keep near the coast of *Portugall*, but homeward bound they are many times forced to run farr *West* to fetch a *Westerly wind*. Likewise Ships bound to the *Barbados* go by the *Canaries*, but come home a great way to the *North-West* of the *Azores*. And the *Virginia-ships* are twice as long in going out, as they are in comming home, and many times longer: for, they come home befor the Wind directly, but

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but goe out round about as the *Tropick*, or at least to 28 degrees Latitude for the benefit of the *North-East Wind*; and when that hath carried them farr *West*, they come back to the *Nordward* again: and then, as the *West*erly wind hangs more or less *Southerly*, they have a good or bad passage.

Between 3. or 4 degrees *Nothern Latitude* the *South-East Wind* begins to take place between the *Equator* and the *Tropick of Capricorne*. But the nearer you are to the coast of *Africa* it is so much more *Southerly*; and as you approach to the coast of *Brasile*, it inclines more and more *Easterly*. And there is not only a Variation in the Wind in respect of *Longitude*, but also in respect of *Latitude*: for, near the *Equator* the wind is more *Southerly*, than it is in the same Meridian near the *Tropick of Capricorne*; as for example, in the great Bay of *Guinea* (which our Seamen call the *Bight of Guiny*) the Wind (as I have been credibly inform'd) is mostly *South*; and inclines as much to the *West* as to the *East*: but in the same Meridian near the *Tropick of Capricorne* I am sure it is constantly between *South-East by East*, and *South-East by South*. And on the contrary in that Meridian, which may be about an 100. Leagues to the *Eastward* of *Brasile* near the *Equator*, the Wind is between *South-East* and *East-South-East*; and in the same Meridian the Winds near the *Tropick* are more variable, but most part about *North-East*.

This, I suppose, is as much as you desire for the Winds within the *Tropick*: and when I have told you, that in our latter Voyage from the *Line* to the *Tropick of Capricorne* we had many Calms, and what winds we had were very small, which was in the latter half of *April* and the former half of *May*, but in our first Voyage in the latter half of *May 1657*. great storms; I have said all I can.

The Stormy days were *May 16 17 18* especially the 17th in 7 degrees *Southern Latitude*. Also the 20th and 21 in the Latitude of 12 and 13 degrees; and the 27th at night in *Southern Latitude* of 22. degrees; which storme was the most sudden and unexpected that ever I saw: for all day it was very fair weather, and so till 8 at night, and the wind at *North-East*, but on a sudden came a violent storm of wind at *South-West*, and in

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in a moment the whole heavens were become black and prodigiously dark, which continued till 4 the next morning, with intolerable rain; and then the wind came again at *North-East*, and it was presently fair.

Near *Africa* the *South-East*-winds hold to 28. or 29. degr. *Southern Latitude*; but towards *Brasile* from the *Tropick of Capricorne* to 32 degrees they are variable, and to the Southward of 32. Westerly; as you may perceive by this following accompt.

May 29. Latit. 24. 47'. Longit. (by the plain Sea-chart) from the *Lizard*, 11. Degr. West, Variation 10d 7' East: fair Weather; the Wind from S W to W. We sailed 50. miles.

June 1. Littlewind, at S W.

June 2. Latit 26. 0 Calme all day, and a great storm all night at South.

June 3. Strong wind at S S E. At 1. at night it came to E b S, and blew with the same violence till next day noon. At 6. in the Evening I saw *Mercury* very near the *Moon*, newly past Conjunction, as I supposed.

June 4. Latit. 26. 15'. South. Longit from the *Lizard* 9. 24. West: the Wind moderate at E b S.

June 5. Latit 27. 32'. a fresh gale at E b N; dark and cloudy, but no rain.

June 6. and 7. the same Wind and Weather.

June 8. darke day, and calme all day and night.

June 9. calme till mid-night; then a little Wind at N W.

June. 10. Latit. 32. degr. Calme all day, and till mid-night; then a fresh gale at N W, that we sailed 66. miles. This day we saw a great Number of *Whales* sporting themselves.

June 11. Latit 32. 43'. the first clear day we had in a fortnight. Strong wind at N W. We sailed 141. miles.

June 12. Latit. 33 44' Long. 5. deg. West. Variat. 9. 40. East Clear weather, till the latter end of the night; then it rain'd: Strong wind at W N W, and a smooth sea; so that we sailed this day 177. miles, the most that our Ship sailed in 24. hours in all the time of the two Voyages, that I sayed in her.

June 13.

June 13. Latit. 34. 15. South. Longit. 2. 7. West. Violent wind At 4. p. m. it shifted suddenly from WNW to WbS. At 10. at night to SWbW; after midnight, to SWbS; about 4. to SSW.

June 14. very great wind at SSW. About mid-night it shifted to W; and immediately follow'd a very terrible storm of Wind and rain; and a great over-grown Sea.

June. 15. at 7. in the morning the wind came back again to SSW. the whole day was a very dreadfull storm of wind. At noon (by accompt) we were in 34. 42. South. Latitude, and 3. 20' to the East-ward of the Meridian of the Lizard. The sea was exceedingly rough. At 4. p. m. fell a great storm of Hail. At night was a great Eclipse of the Moon, which I could not at all observe my self, because the Storm raged at the time of the Eclipse more than ever, the waves so beating over the ship, that I could not be upon the deck: but the Masters Mates, who had the watch (to whom I gave charge concerning it) said, that she begun to be totally dark about half a quarter past 8; and began to recover some of her light 2. minutes before 9, as we reckoned the time by our Glasses. As soon as the Eclipse was ended, the storm began to abate, and the raging of the Wind and Seas so calmed, that by morning we set up our Top-sailes.

June 16. a little before Noon the wind came to West, and continued a strohg gale but with fair weather.

June 17. Latit. 35. South. Longit. (from the Lizard 7^h degr. East. Variation 2. 30'. East. We saw many great heaps of weeds in the Sea, and a great rolling Sea came out of the South. A strong wind (without gusts) all this 24. hours at West. P. M. the sky was extream foul and thick, so that we fear'd more bad Weather. It continued so till 7. at night; and then 6. or 7. minutes it became as clear as Chrystal (to our great admiration at so sudden a change,) and so continued all night.

June 18. a very strong wind at West: a darke day and clear night. We sailed 170. miles East.

June 19. the same wind and weather.

June 20. the wind much abated.

June 21. was the first clear day we had this month. Latit. was 35. 40'. South. Longit. 17. 40'. East-ward, from the Lizard

Lizard. Variation, 1. 4'. West. The Wind was at N W. till 4. p. m; then it came to West with a thick sky and cold rain. At 8. to WSW. At 3. in the mornig to S W, and at 6. to SSW. At 9^o the next day to South; all strong winds.

June 22. dark and cloudy. At 2. of the clock, the wind came to SSE. At 4, to ESE. At 10, to East, and there continued till the 24th in the morning; which all accounted very strange.

June 24. in the morning it fell calm, and was pretty warm, having been bitter cold the last 10. dayes. * At 3 o'clock in the night a fresh gale at NNW.

* This Observation of the bitter Cold in the Southern Latit. of between 35. and 36. degrees may be referred to those related by Mr. Boyle in his Experimental History of Cold p. 491; whence he raiseth this Note: That the greater or lesser Coldness of the Air in several Climates and Countrys is nothing near so regularly proportioned to their respective distances from the Pole, or their Vicinity to the Equator, as men are wont to presume.

June 25. Latit. 36. 10'. Longit. 21. 25. Variation 3. 40'. West. Fair weather Wind NNW

June 26. A clear day. Wind N NW. Variation 4. 30.

June 27. in the morning calm about 9, wind and rain out of the S W. At night calm and fair.

June 28. A fair day, and most part calm, for we sailed but 17. miles

in 24. houres. At 10. at night, heaving the Lead we had ground 130. fathoms. the sand like Calais-sand. The Variation was 7. 10'. This was off Cape Agulhas, the most Southerly Land of all Africa, lying 90. miles ESE. from the Cape of Good Hope.

In our latter Voyage, after we came to 32. degr. South. Latitude (to which the place from the Line we were much becalmed) we had fair weather, and a constant Wind between WNW and WSW all along to the Cape (and so it was most of the voyage) and I have therefore noted the weather in the former Voyage, because it was un-usuall; in that vast space between Rio del Plata and the Cape the wind being all the year Westerly. But about the Cape from the end or middle of September to the beginning of April, the winds are variable as in England. The rest of the year they are Westerly, and inclem-
itable storme.

I can give you no account of any thing to the southward of 37. degrees; those few ships, that have adventured to 38°, reporting the winds and seas so raging, that none dare goe further.

Some considerations touching the variety of slate, together with a computation of the Charges in generall, for Covering Houses therewith; by Mr. Sam. Colepres.

Whereas among the Materials for Building, that for Covering is not the least to be considered, among the kinds thereof our Country-slate is not to be despised, and that as well for its Stateliness, as Permanency; to which may be added its Cheapness. The first whereof needs no better Evidence, than the Esteem, the slated Houses in or about London (though there are many of them) generally meet with from all, that but take notice of them. For the Second, we have some sorts, which by the conjectures of the most experienced Helliers (or Coverors with Slat) have continued on houses severall hundreds of years, and are yet as firm, as when first put up. And for the third, the computation of Charges, annexed below, may give some hints, as easily to guess at the whole Charge thereby, as compared with Tiling, Leading, Boarding &c. (comparatis comparandis.)

I shall therefore the less scruple to offer some occasional Trials (though common ones, for ought I know,) whereby the firm and lasting goodness of any slate may easily be experimented and without expence.

1. Take the thin cleft stone, flat or shindle, and so knock it against any hard matter, as to make it yield a sound. If the sound be good and clear, that sort of stone is not crazy, but firm and good. Or

2. If in hewing it does not break before the edge of the scuts (the hewing instrument of the Slatters) you may not much doubt of the firmness of the Slat. But

3. If after it hath been exactly weighed (and the account thereof laid by) it be put, and for 2. 4. or 8. hours left to remaine all under water in a vessel; and afterwards taken up

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